Measurements of Ommastrephes illecebrosa, males, (in inches).

Locality.	Vineyard Sd.	Vineyard Sd.	Eastport.	Eastport.	Eastport.	Vineyard Sd.	Mass. Bay.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Cape Cod.	Newport.
Sex and designation,	♂ J	♂ L	♂ H	♂ I	♂ R	♂ M	♂ W	♀ ii	♀ iii	♂ iv	♂ v	♂ vi	♂ vii	♂ viii	♂ ix	xi	♂ xii	♀ xiii	♀ xiv	10280		
End of body to edge of mantle, above,	8·70	8·50	7·80	7·45	7·10	6·80	6·15	4·00	4·40	5·25	4·05	4·15	6·70	5·55	6·70	5·60	5·80	4·15	4·10	2·70		
End of body to edge of mantle, beneath,	8·10	8·00	7·30	7·10	6·70	6·35	6·00	3·70	4·00	4·80	3·90	4·00	6·30	5·25	6·15	5·40	5·70	3·90	3·85	2·60		
End of body to origin of fin,	3·50	3·30	3·00	2·90	2·80	2·70	2·30	1·45	1·60	2·00	1·45	1·50	2·60	2·10	2·60	2·20	2·20	1·50	1·40	·90		
End of body to center of eye,	9·50	9·30	8·20	7·80	7·50	7·10	6·80	4·35	4·70	5·45	4·10	4·40	7·10	5·90	6·90	5·90	6·25	4·30	4·20	3·00		
End of body to base of dorsal arms,	10·00	10·30	9·00	8·20	8·20	7·80	7·10	4·50	5·00	5·75	4·50	4·80	7·70	6·30	7·70	6·50	6·60	4·60	4·55	3·15		
Eye to tip of dorsal arms,	4·50	4·15	3·05	2·60	2·95	3·30	2·70	1·35	1·65	2·05	1·35	1·50	2·90	2·10	3·00	2·50	2·35	1·40	1·40	1·30		
Eye to tip of 2d pair of arms,	4·90	4·80	3·50	2·95	3·20	3·60	3·00	1·45	1·85	2·30	1·50	1·70	3·10	2·35	3·30	2·80	2·65	1·65	1·50	1·65		
Eye to tip of 3d pair of arms,	4·95	4·90	3·30	2·95	3·40	3·80	2·95	1·50	1·80	2·20	1·45	1·70	3·00	2·35	3·10	2·60	2·40	1·70	1·55	1·55		
Eye to tip of 4th pair of arms,	4·50	4·10	3·10	2·90	3·20	3·35	2·70	1·40	1·70	2·20	1·35	1·50	2·90	2·00	2·95	2·50	2·25	1·60	1·30	1·25		
Eye to tip of tentacular-arms,	6·50	5·70	4·40	4·00	4·20	4·85	3.70	1·90	2·40	2·75	2·15	2·20	4·20	3·30	5·40	3·60	3·10	2·30	2·00	2·25		
Breadth of head across eyes,	1·60	1·30	1·40	1·15	1·30	1·00	1·20	·70	·80	·90	·75	·80	1·20	1·00	1·10	1·00	·90	·70	·70	·58		
Breadth of head in front of eyes,	1·60	1·30	1·25	1·05	1·20	1·00	1·00	·60	·70	·80	·70	·65	1·05	·90	1·00	·90	·85	·70	·60	·46		
Breadth of body,	2·10	1·75	1·55	1·40	1·35	1·20	1·05	·80	·80	·90	·80	·70	1·10	·95	1·15	1·15	1·00	·80	·70	·60		
Breadth of caudal fins,	5·15	4·35	4·30	3·60	3·75	3·70	3·00	1·95	2·20	2·60	1·90	2·05	3·30	2·70	3·40	2·75	2·70	2·05	1·90	1·35		
Circumference of body,	6·30	5·60	4·80	4·30	4·05	3·90	3·10	2·10	2·20	2·95	2·40	2·40	3·20	2·90	3·80	3·30	3·15	2·25	2·20	--		
Length of tentacular-club,	2·55	2·50	1·89	1·60	1·85	2·30	1·60	·90	1·10	1·20	·95	1·00	1·65	1·40	2·10	1·50	1·40	·90	·95	1·15		
Diameter of largest suckers of club,	.17	·14	·12	·11	·13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	·01		
Of largest suckers on 3d pair arms,	·20	·16	·15	·15	·14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Ratio of fin to length of mantle, 1:	2·48	2·57	2·60	2·57	2·53	2·51	2·67	2·75	2·75	2·62	2·80	2·76	2·58	2·64	2·58	2·54	2·63	2·76	2·85	3·00		
Breadth of fin to length of mantle, 1:	1·69	1·95	1·81	2·10	1·90	1·83	2·05	2 05	2·00	2·02	2·15	2·02	2·03	2·05	1·97	2·03	2·15	2·02	2·16	2·00		

Measurements of Ommastrephes illecebrosa, females, (in inches).

Locality.	Eastport.	Eastport.	Vineyard Sd.	Eastport.	Eastport.	Eastport.	Eastport.	Eastport.	Casco Bay.	Casco Bay.	Newfoundl'd.	Maine.	Halifax.	Cape Cod.
Sex and designation,	♀ D	♀ E	♀ K	♀ O	♀ N	♀ G	♀ P	♀ F	♀ U	♀ T	♀ Q	♀ X	♀	♀ ✕
End of body to edge of mantle, above,	7·80	7·15	9·50	8·70	8·70	8·60	8·10	7·80	7·45	6·85	8·80	5·55	8·70	6·25
End of body to edge of mantle, beneath,	7·30	7·00	8·70	8·30	8·05	8·10	7·60	7·20	6·85	6·50	8·40	5·30	7·90	6·10
End of body to origin of fin,	3·10	2·80	3·70	3·40	3·50	3·40	3·20	3·10	3·00	2·85	3·50	2·15	3·60	2·40
End of body to center of eye,	8·25	7·60	10·00	9·10	9·00	9·30	9·10	8·30	7·98	7·30	9·60	5·80	9·70	6·70
End of body to base of dorsal arms,	9·00	8·00	10·50	9·90	9·70	10·00	9·85	8·70	8·20	7·80	10·50	6·20	10·50	7·20
Eye to tip of dorsal arms,	4·00	3·50	4·80	4·30	4·45	4·20	4·20	3·30	3·00	2·30	4·70	--	5·60	2·65
Eye to tip of 2d pair of arms,	4·55	3·70	5·60	4·75	4·95	4·40	4·70	3·90	3·50	3·25	5·10	2·55	6·30	2·65
Eye to tip of 3d pair of arms,	4·50	3·60	5·40	4·75	4·65	4·30	4·75	3·65	3·45	3·30	5·15	2·50	6·20	2·80
Eye to tip of 4th pair of arms,	4·30	3·20	5·40	3·80	4·40	4·20	4·75	3·60	3·20	3·20	5·00	--	6·15	2·70
Eye to tip of tentacular-arms,	7·00	4·60	8·10	7·00	6·00	5·50	8·00	6·10	4·80	4·95	7·00	3·40	10·50	3·70
Breadth of head across eyes,	1·35	1·15	1·30	1·60	1·50	1·55	1·30	1·20	1·35	1·10	1·90	1·00	1·50	1·05
Breadth of head in front of eyes,	--	--	1·45	1·40	1·50	1·50	1·30	1·10	1·25	1·00	1·65	--	--	1·00
Breadth of body,	--	--	1·72	1·60	1·90	1·85	1·00	1·20	1·50	1·25	2·35	--	--	1·20
Breadth of caudal fins,	4·25	3·85	5·50	4·15	4·85	5·00	4·30	4·00	4·05	3·70	5·50	2·85	5·30	3·10
Circumference of body,	--	--	5·65	4·70	5·25	5·80	4·75	3·90	4·40	3·70	6·80	--	--	3·50
Length of tentacular-club,	2·75	1·85	2·85	3·20	2·75	2·60	3·15	2·00	2·00	1·90	2·70	1·55	4·20	1·55
Diameter of largest suckers of club,	·15	·11	·16	·18	·18	·20	·17	·12	--	--	·17	--	·19	--
Of largest suckers on 3d pair arms,	·14	·11	·16	·18	·20	·19	·15	·13	--	--	·18	--	·20	--
Ratio of fin to length of mantle, 1:	2·51	2·55	2·56	2·56	2·46	2·52	2·53	2·51	2·48	2·40	2·51	2·58	--	2·60
Breadth of fin to length of mantle, 1:	1·85	1·85	1·72	2·09	1·80	1·72	1·88	1·95	1·83	1·85	1·60	1·95	--	2·01

Coast of Rhode Island (Verrill) to Cumberland Gulf (Kumlein). Abundant from Cape Cod to Newfoundland. Newport, R. I. (U. S. Fish Com.) Vineyard Sd., Mass., rare, large in winter, small in May (V. N. Edwards).

Ommastrephes illecebrosa.—Specimens examined.

No.	Locality.	When Collected.	Received from.	Specimens. No.	Sex.
10280	Newport, R. I.	1872	U. S. Fish Com.	1	young.
10027, J.	Vineyard Sound.	Nov. 2, 1876	V. N. Edwards	1	♂, left-hand.
10027, K.	" "	" "	" "	1	♀
10027, L.	" "	" "	" "	1	♀
M.	" "	May, 1876	" "	1	♂, r.-hand.
W.	Provincetown, Mass.	July, 1879	U. S. Fish Com.	1	♂, fig'd.
--	" "	" "	" "	9	♂
--	" "	" "	" "	5	♀
--	" "	" "	" "	3	young.
--	" "	" "	" "	28+,	dupl.
--	Salem, Mass.	Oct. 25, 1873	J. H. Emerton	1	♀
--	Gloucester, Mass.	1878	U. S. Fish Com.	1	young.
S. T. U.	Casco Bay, Me.	1873	U. S. Fish Com.	3	♀
X.	Off Seguin I., Me. (50 fath.)	1879	(lot. 517) U.S.F.C.	1	♀ young.
--	Mt. Desert, Me.	1860	A. E. Verrill	50+,	large.
--	Off Cashe's Ledge.	1873 (loc. 21)	U. S. Fish Com.	1,	mutilated.
9693, G.	Eastport, Me.	1870	A. E. Verrill	1	♀, large.
9693, H. I.	" "	"	" "	2	♂, left-hand.
9693, R.	" "	"	" "	1	♂, r.-hand.
D. E. F.	" "	1872	U. S. Fish Com.	3	♀, large.
N. O. P.	" "	"	" "	3	♀
--	" "	"	" "	1	young.
--	Halifax, N. S.	J. R. Willis	Smithsonian	1	young.
10028	" "	J. M. Jones	J. M. Jones	1	♀, large.
10278, Q.	Newfoundland.	" "	" "	1	♀, large.
--	Cumberland Gulf.	L. Kumlein	Nat. Museum	1	mutilated.

Several of the smaller specimens, included in this list, are so young that it is impossible to determine their sex with certainty, without dissection. The hectocotylization of the ventral arm in the male is scarcely recognizable in those with the mantle less than 4 inches long.

The Mediterranean form, usually identified with the *var. b*, of *Loligo sagittata* Lamarck, 1799,* is closely related to our species, but if the published figures and descriptions can be relied upon, it can hardly be identical, as D'Orbigny and other writers have considered it. The American form has a more elongated body, with a differently shaped caudal fin, which is relatively shorter than the best authors attribute to *O. sagittatus*. The figure given by Verany is, however, an exception in this respect, for in it the body is represented about as

* It seems more probable, however, that Lamarck's description applied rather to *O. Bartramii* (Les. sp.) of the Gulf Stream region. Blainville and others have thus applied it, correctly, as I believe.

long as in some of our larger specimens.* It should be remarked, however, that Lesueur's figure of *O. illecebrosa* shows the body too small and too short in proportion to the size of the fin, and the fin wrong in shape and occupying more than half the length of the mantle; the proportions of the arms are also erroneous. But Lesueur explains these defects by his statement that the figures were hasty sketches made for the sake of preserving the colors, and that he saved a specimen by which to correct, afterwards, his drawings and description, but the specimen saved turned out to be *L. pavo*, so that the original sketches were published without correction. Tryon's figure 342 is a poor copy of one of Lesueur's, without credit.

If the European form be really identical with the American, its distribution is very anomalous, for while the former is a southern European form, inhabiting the Mediterranean and scarcely extending north of the southern waters of Great Britain, where it appears to be rare, our species is strictly a northern, cold water form, rarely found south of Cape Cod, even in winter. Its range extends quite to the Arctic Ocean.

Notes on Habits.

When living, this is a very beautiful creature, owing to the brilliancy of its eyes and its bright and quickly changing colors. It is also very quick and graceful in its movements. This is the most common 'squid' north of Cape Cod, and extends as far south as Newport, R. I. It is very abundant in Massachusetts Bay, the Bay of Fundy, and northward to Newfoundland. It is taken on the coast of Newfoundland in immense numbers, and used as bait for cod-fish. It occurs in vast schools when it visits the coast, but whether it seeks those shores for the purpose of spawning or in search of food is not known. I have been unable to learn anything personally in regard to its breeding habits, nor have I been able to ascertain that anyone has any information in regard either to the time, manner, or place of spawning. At Eastport, Me., I have several times observed them in large numbers, in midsummer. But at that time they seem to be wholly engaged in the pursuit of food, following the schools of herring, which were then in pursuit of shrimp (*Thysanopoda Norvegica*), which occur in the Bay of Fundy, at times, in great quantities, swimming at the surface. The stomachs of the squids taken on these occasions were distended with fragments of *Thysanopoda*, or with the flesh of the herring, or with a mixture of the two, but their reproduc-

* According to Jeffreys (Brit. Conch., V, p. 129, pl. 5) the English *O. sagittatus* has the fin "from $\frac{2}{3}$ to nearly $\frac{1}{2}$ the length of the mantle;" and the form of the pen as figured by him, is different from that of our species.

tive organs were not in an active condition. The same is true of all the specimens that I have taken at other localities in summer. From the fact that the oviducts are small and simple, and the nidamental glands little developed, I believe that it will eventually prove that this species discharges its eggs free in the ocean, and that they will be found floating at the surface, either singly or in gelatinous masses or bands, not having any complicated capsules to enclose them. Nothing is known as to the length of time required by this species to attain its full size. It probably lives several years.

This squid is an exceedingly active creature, darting with great velocity backward, or in any other direction, by means of the reaction of the jet of water which is ejected with great force from the siphon, and which may be directed forward or backward, or to the right or left, by bending the siphon. Even when confined in a limited space, as in a fish-pound, it is not an easy matter to capture them with a dip-net, so quick will they dart away, to the right and left. When darting rapidly the lobes of the caudal fin are closely wrapped around the body* and the arms are held tight together, forming an acute bundle in front, so that the animal, in this condition, is sharp at both ends, and passes through the water with the least possible resistance. Its caudal fin is used as an accessory organ of locomotion when it slowly swims about, or balances itself for some time nearly in one position in the water.

The best observations of the modes of capturing its prey are by Messrs. S. I. Smith and Oscar Harger, who observed it at Provincetown, Massachusetts, among the wharves, in large numbers, July 28, 1872, engaged in capturing and devouring the young mackerel, which were swimming about in 'schools,' and at that time were about four or five inches long. In attacking the mackerel they would suddenly dart backward among the fish with the velocity of an arrow, and as suddenly turn obliquely to the right or left and seize a fish, which was almost instantly killed by a bite in the back of the neck with their sharp beaks. The bite was always made in the same place, cutting out a triangular piece of flesh, and was deep enough to penetrate to the spinal cord. The attacks were not always successful, and were sometimes repeated a dozen times before one of these active and wary

* This position of the fins is well shown in Plate 26, fig. 341, of Binney's edition of Gould's Invertebrata of Massachusetts. This figure was probably drawn by Mr. Burkhardt from living specimens formerly kept in Cutting's Aquarium, in Boston, about 1860 to 1862. This figure is very good, in most respects, except that the clubs of the tentacles have been confounded with the ventral pair of the sessile arms, and thus the suckers are made to continue along the whole length of the tentacles.

fishes could be caught. Sometimes, after making several unsuccessful attempts, one of the squids would suddenly drop to the bottom, and, resting upon the sand, would change its color to that of the sand so perfectly as to be almost invisible. In this position it would wait until the fishes came back, and when they were swimming close to or over the ambuscade, the squid, by a sudden dart, would be pretty sure to secure a fish. Ordinarily, when swimming, they were thickly spotted with red and brown, but when darting among the mackerel they appeared translucent and pale. The mackerel, however, seemed to have learned that the shallow water was the safest for them, and would hug the shore as closely as possible, so that in pursuing them many of the squids became stranded, and perished by hundreds, for when they once touch the shore they begin to pump water from their siphons with great energy, and this usually forces them farther and farther up the beach. At such times they often discharge their ink in large quantities. The attacks on the young mackerel were observed mostly at or near high-water, for at other times the mackerel were seldom seen, though the squids were seen swimming about at all hours; and these attacks were observed both in the day and evening.

It is probable, from various observations, that this and other species of squids are partially nocturnal in their habits, or at least are more active in the night than in the day. Those that are caught in the pounds and weirs mostly enter in the night, evidently while swimming along the shores in 'schools.' They often get aground on the sand-flats at Provincetown, Massachusetts, in the night. On the islands in the Bay of Fundy, even where there are no flats, I have often found them in the morning, stranded on the beaches in immense numbers, especially when there is a full moon, and it is thought by many of the fishermen that this is because, like many other nocturnal animals, they have the habit of turning toward and gazing at a bright light, and since they swim backwards, they get ashore on the beaches opposite the position of the moon. This habit is also sometimes taken advantage of by the fishermen, who capture them for bait for cod-fish; they go out in dark nights with torches in their boats, and by advancing slowly toward a beach, drive them ashore.

They are taken in large quantities in nets and pounds, and also by means of 'jigs' thrown at random into the 'schools' and quickly drawn through them. They are also sometimes taken by lines, adhering to the bait used for fishes.

Their habit of discharging an inky fluid through the siphon, when irritated or alarmed, is well known. The ink is said to have caustic and irritating properties.

This squid, like the *Loligo*, is eagerly pursued by the cod and many other voracious fishes, even when adult. Among its enemies while young, are the full grown mackerel, who thus retaliate for the massacre of their own young by the squids. The specimens observed catching young mackerel were mostly eight to ten inches long, and some of them were still larger.

From the rapidity with which the squids devour the fish that they capture, it is evident that the jaws are the principal organs used, and that the odontophore plays only a subordinate part in feeding. This is confirmed by the condition of the food ordinarily found in the stomach, for both the fishes and the shrimp are usually in fragments and shreds of some size, and smaller creatures, like amphipods, are often found entire, or nearly so; even the vertebræ and other bones of herring are often present. On the other hand, in some specimens, the contents of the stomach are finely divided, as if the odontophore had been used for that purpose.

Notes on the Visceral Anatomy.

PLATE XXXVIII, FIGURE 2. PLATE XXXIX, FIGURE 2.

This species, in common with others of the same genus, is very different from *Loligo Pealei* in the form and structure of many of its internal organs. The branchial cavity is larger and the gills (g, g) originate farther back and are much larger than in *Loligo*, their length being about two-fifths the entire length of the body; they originate back nearly at the middle of the body. The liver (l, l) is much larger and more conspicuous, consisting of two large, oblong, lateral lobes or masses, closely united together in the median plane, with a groove along the dorsal side, in which lies the œsophagus. The ink-bag (i) is elongated-pyriform, with a silvery luster externally, but blackish when filled with the 'ink.' The size and form of the stomach and its cœcal lobe (s, s') vary greatly according to their degree of distention with food. When well filled they are large, thin, saccular, and more or less pyriform; the cœcal lobe extending back nearly to the end of the body. The intestine (h) has two spatulate papillæ, one on each side of the anal orifice.

The heart (H) is large, somewhat irregular, and unsymmetrical, with four points, the two lateral continuous with the afferent vessels

(*bo*) of the gills; the anterior passing into the anterior aorta (*ao*); the posterior, median one, continuous with the posterior aorta, gives off, first a small ventral branch, which supplies the reproductive organs, and then later a median ventral artery (*o*), going to the mantle; while much farther back it divides into two branches (*o'*, *o'*) which supply the sides of the mantle and caudal fin. The branchial auricles (*au*) are large and ovate, with a small round capsule at the posterior end.

The urinary organs or 'kidneys' (*r*, *r*) are voluminous, lobulated organs, intimately connected with the venæ cavæ, and mostly situated below and in front of the heart, but there is a more compact glandular portion (*r'*) extending, as usual, backward along each of the posterior venæ cavæ (*vc''*) in the form of a long pyriform gland. Just in front of the bases of the gills, on each side, there is a circular opening (*u*) through the peritoneal membrane, which probably gives exit to the urinary excretions.

The reproductive organs of the female, however, present the greatest divergence from *Loligo*, and allied forms. Instead of having a single large oviduct, on the left side only, and opening far forward, we find, in this genus, two small oviducts (*od*) symmetrically placed and opening much farther back. Moreover, instead of the large and very conspicuous, unsymmetrical nidamental glands, situated in front of the heart, as in *Loligo*, we find in *Ommastrephes* much smaller and simpler glands (*xx*) situated much farther back, side by side, near the median line.

The ovary (*ov*) is a long, pyriform, lobulated organ; its anterior end is attached to the posterior end of the stomach, and is divided into several short lobes, which clasp the end of the stomach; its small posterior end extends backward into the concavity of the hooded portion of the pen (*p''*).

The spermary or testicle of the male (Plate XXXVIII, fig. 2, *t*) occupies the same position as the ovary; it is a more compact organ, with a smoother surface, and the anterior lobes are longer and narrower and extend farther forward along the sides of the stomach. The prostate gland and other male organs resemble those of *Loligo* (see Plate XL, figures 1, 2).

It must be borne in mind, however, that none of the specimens examined were in their breeding season. Consequently the reproductive organs were all much smaller and less conspicuous than they would have been in breeding individuals. This is particularly the case with the ovaries and spermaries, but the same remark would

also apply to the nidamental glands, which might assume a different form, as well as greater volume, at the breeding season.

The specimens dissected had all been preserved in alcohol, which, also, would cause these organs to appear smaller than is natural.

Additional note on distribution.—After the previous pages were printed, additional specimens of this species were obtained, extending its range much farther southward, in the deep water, near the edge of the Gulf Stream. Although we cannot be certain that specimens thus caught in the trawl were living at the bottom, owing to the possibility of their entering it during its ascent, it is very probable that they do actually inhabit those depths. This is rendered more probable by the fact that we found adult specimens in the stomachs of fishes (*Lophius*), taken at stations 865 and 893. The most southern specimens known were taken by Mr. A. Agassiz on the "Blake," off Cape Hatteras, in 263 fathoms.

Additional Specimens Examined.

Locality.	Fath.	When Coll'd.	Rec'd. From.	Specimens. No. Sex
865. N. L. 40° 05′; W. Lg. 70° 23′	65	1880	U. S. F. Com.	1 ad.
893. N. L. 39° 52′ 20″; W. Lg. 70° 58′	372	1880	" "	1 ad.
CCCXXXII, N. L. 35°45′30″; W. Lg. 74° 48′	263	1880	"Blake" exp.	3 ♀ ad.

Sthenoteuthis megaptera Verrill.

This volume, p. 223, plate 21, figs. 1–9, Feb., 1880.

PLATE XXI. PLATE XXVII, FIGURE 6. PLATE XLV, FIGURES 5, 5*a*.

Since printing the description of this species, in the first part of this volume, when only two examples were known, some additional specimens have been obtained.

The most important of these consists of the tentacular club and the pharynx, with the jaws and odontophore complete (Plate XLV, fig. 5). These are from a specimen, of which the head and arms were found in the mouth of a cod-fish, on the eastern part of George's Bank, by Manuel D. Mitchel, and were by him presented to the U. S. Fish Commission. The portions of the specimen not saved were used as bait for cod. The arms were described as 18 inches long.

The part of the tentacular club in my possession, which does not include the proximal portion, is 175^{mm} long, 17 broad, in the middle; the distal portion, beyond the large suckers, is 62 long, breadth of its sucker-bearing face, 8; from front to back, including width of dorsal keel, but not the suckers, 18; diameter of largest suckers, 12, of horny rings, 11; of aperture, 8; height of horny ring, outer side,

including teeth, 6·5; length of pedicels, 5; distance between pedicels, 15mm. The large suckers agree very well with those described and figured from the type-specimen (Pl. XXI, fig. 9); this portion of the club had nine of these large suckers in each row; their pedicels arise from the middle of deep squarish depressions, between which run thick transverse ridges, which bear the smaller marginal suckers toward their outer ends, and then support the marginal membrane. A part of the large suckers have retained their horny rings, but all the marginal and small distal suckers have lost them. The horny rings of the large suckers (fig. 5*a*) are oblique, much higher on the outer than on the inner side; the edge bears about 28 sharp, incurved, well-separated, unequal teeth; of these the largest is at the middle of the outer edge; another smaller one, but larger than its fellows, is at the middle of the inner edge; two others, in size similar to the last, occupy the middle of the lateral edges; thus the edge is divided into four equal parts, by the four larger teeth, between which there are five or six smaller, very acute teeth, separated by spaces greater than their breadth. The horny rings are amber-brown, the teeth are golden yellow at tip. The distal portion of the club is compressed, with the face narrow and tapering, but with an elevated dorsal keel; it bears four crowded rows of small, pedicelled suckers, the two rows on one side of the median line being composed of very much smaller suckers than the other two. At the very tip of the club there is a round cluster of small, smooth suckers, as in *Architeuthis*. The buccal mass is 52mm in length and 42 in diameter. A thick buccal membrane, covered with low, irregular verrucæ, surrounds the jaws. The jaws are sharp and strong; their exposed portions are black, the alæ reddish brown. The beak of the upper jaw is long, strongly incurved, acute, its cutting edge regularly curved, with a deep notch at its base, from which a well-defined groove runs downward. The lower jaw is sharp, its cutting edge is most concave near the tip, below which it is nearly straight, sides covered with fine radiating lines; basal notch broad, shallow, angular; beyond the notch there is a broad, low angular tooth. The surface of the fleshy palate is covered with low rounded verrucæ. The odontophore is broad, with sharp, pale amber-colored teeth, which agree well with those of the original specimen (Plate XXI, figures 3–7); outside of the lateral teeth there is a narrow, raised, chitinous ridge, apparently not divisible into plates.

Another specimen, consisting of the buccal mass and jaws, but without the odontophore, was presented to the U. S. Fish Commis-

sion (lot 797) by Captain Chas. Anderson and crew of the schooner "Alice G. Wunson," of Gloucester, Mass.

The jaws of this were slightly larger than in the one just described. They agree well in nearly every respect, but the notch at the base of the lower mandible is narrower and the tooth beyond it broad and rounded.

Measurements of jaws, in millimeters.

Number of Lot.	810	797
Upper jaw, tip to bottom of notch,	12	13
Transverse breadth, at notches,	9	10
Tip to end of frontal lamina,	38	41
Lower jaw, tip to bottom of notch,	11	13
Tip to notch of mentum,	11	14
Tip to ventral end of gular lamina,	--	25
Mentum to inner end of lateral alæ,	31	36
Breadth of lateral alæ,	15	15
Breadth of odontophore, across face,	5·5	

A fifth specimen, received in lot 879, Oct., 1880, consists of two of the sessile arms, but the suckers have lost their horny rings, so that the identification cannot be very positive. The largest arm, which is not quite entire, is 255^{mm} long, and 23^{mm} in diameter, at the larger end. It was taken from the stomach of a cod, on the Grand Banks, and presented to the U. S. Fish Commission by the Captain and crew of the schooner "Otis P. Lord."

Specimens Examined.

Lot.	Locality.	Fath.	When rec'd.	Name of vessel.	Received from.	Specimens.
	C. Sable, N. S.	Beach.			Halifax Mus'm	1, entire.
	Sable I. Bank	280–300	Sept., 1878.	A. H. Johnson	U.S. Fish Com.	1, jaws, etc.
810	George's Bank	Cod stom.	Aug., 1880.	Sultana	"	1, jaws & arm.
797	E. slope G.'s B.	Cod stom.	Aug., 1880.	Al. G. Wunson	"	1, jaws.
879	Grand Banks	Cod stom.	Oct., 1880.	Otis P. Lord	"	1, arms.

Sthenoteuthis Bartramii Verrill.

Loligo sagittatus (pars) Lamarck, 1799; Anim. sans Vert., vii, p. 665.

Loligo Bartramii Lesueur, Journ. Phil. Acad., I, vol. ii, p. 90, plate 7, 1821.

Blainville, Dict. Sci. Nat., xxvii, p. 141, 1823.

Loligo sagittatus Blainv., Dict. Sci., Nat., xxvii, p. 140.

Ommastrephes Bartramii D'Orb., Voy. Amer. Merid., Moll., p. 55, 1838 (t. Gray); Céph. Acétab., pl. 2, figs. 11–20.

Gray, Catal. Moll. Brit. Mus., Cephal. Antep., p. 62, 1849.

Verrill, Invert. Vineyard Sound, etc., p. 341 [635], 1874 (*non* Binney, in Gould, Invert. Mass.)

Tryon, Man. Conch., i, p. 180, pl. 80, figs. 361, 362 (from D'Orb.).

Sthenoteuthis Bartramii Verrill (continued).

Sthenoteuthis Bartramii Verrill, this volume, p. 223, Feb., 1880; Amer. Journ. Sci., xix, p. 289, Apr., 1880.

Ommatostrephes Bartramii Steenstrup, Oversigt Kongl. D. Vidensk. Selsk. Forhandl., 1880, (received Aug.), auth. sep. copy, p. 9, fig. 2, p. 11, fig. 3, p. 19.

Body cylindrical, elongated, slender, tapering but little in front of the fin; anterior edge of mantle with a very slight, median dorsal angle. Caudal fin short and transversely rhomboidal, with the outer angles acute, posterior angle obtuse, and the front edges rounded and projecting forward beyond the insertion. Length of fin (from insertion) to its breadth, as 1 : 2; length of fin to mantle, as 1 : 2·80, in a young female specimen with the body 3·25 inches long. Head short, as broad as the body; eye-opening angular, higher than long, with a narrow oblique sinus. Nuchal frills nearly as in *O. illecebrosa*, consisting of a low, transverse, undulated ridge extending around both sides to the dorsal line, and with three raised longitudinal membranes on each side. Siphon large, sunken in a deep pit; anterior border of the pit with a series of 6 to 12 or more (variable with age), small and short furrows, which extend inward only a short distance from the edge. Arms rather short, not very unequal; the dorsal ones are a little the shortest and smallest; the third pair are the longest, the second and fourth pairs are intermediate in length, and nearly equal; the arms of the second pair are furnished with a well-developed membrane along the lower outer angle, and with a thin marginal membrane of moderate width along the inner angles, outside the suckers, that on the lower side extending beyond the suckers. Those of the third pair are compressed, with a well-developed membranous keel on the median outer edge, beyond the basal portion; on the lower inner angle there is a broad, thin, marginal membrane, extending beyond the suckers, and a narrow one on the upper side; the dorsal and ventral arms have narrow marginal membranes. Suckers of the dorsal and lateral arms furnished with horny rings which have the edge divided into small, acute-triangular teeth, largest on the outer side; on the ventral arms the suckers are smaller, those on the proximal half of the arm having smooth-edged rings, while those on the distal portion are sharply toothed on the outer edge. Tentacular arms slender and moderately elongated, with distinctly broader clubs, which are keeled on the back side and furnished with a thin marginal membrane on each edge. The suckers consist of two median alternating rows of larger oblique, dentate suckers, of which seven to nine in each row are decidedly largest;

alternating with these, on each margin there is a row of smaller, more oblique, sharply denticulate, marginal suckers; distal narrowed face of the club covered with four rows of minute crowded suckers, and a small cluster at the tip; the proximal part of the club has an irregular group of few, small, denticulate suckers, beyond which, extending down on the upper margin of the arm, is a row of about five or six small, smooth-edged, connective suckers, alternating with small round tubercles, of corresponding size; along the lower edge of the arm, for about the same distance, there is a row of more minute pedicelled suckers. The horny rings of the larger median suckers are oblique, and the edge is divided into many small slender teeth, longer on the outer margin; the teeth of the marginal suckers are similar, but more unequal and more incurved.

Specimens in alcohol generally show a distinct, dark purplish brown dorsal stripe, where the chromatophores are very much crowded.

Total length to tips of lateral arms, 121^{mm}; tail to base of arms, 93; body, 82; length of caudal fin, to insertion, 29; its breadth, 58; diameter of body, 16; length of tentacular arms, 48^{mm}. Young.

Middle Atlantic and West Indies; common in the region of the Gulf Stream.

This is an exceedingly active species, swimming with great velocity, and not rarely leaping so high out of the water as to fall on the decks of vessels. On this account it has been called the "*flying squid*," by sailors.

It is a more slender species than *O. illecebrosa*, with a shorter fin, and it has but four rows of small suckers on the distal part of the club, instead of eight. The most important differences, of generic value, are the presence of connective suckers and tubercles on the tentacular arms, and the great development of the marginal membranes on the lateral arms. The grooves in the siphon-pit are of comparatively little importance.

Gonatus Gray.

Gonatus Gray, Catalogue Mollusca Brit. Mus., i, Cephal. Antep., p. 67, 1849, (characters inaccurate.)

Body slender, tapering; caudal fins short, broad, united posteriorly. Pen narrow anteriorly; thin and lanceolate posteriorly, with a terminal, hood-like expansion. Sessile arms with four rows of small, pedicellated suckers, those of the two median rows larger, with a horny ring, having a single large hooked claw on the outer edge; outer

suckers with larger pedicels, the horny ring with several small denticles. All the suckers have a circle of minute scales or plates around the aperture. Tentacles long and slender, the terminal part dilated into a narrow club, with a membranous keel; the club is covered with minute denticulated suckers, like the outer ones of the sessile arms; smaller suckers extend for some distance along the arm; center of the club, with one or two larger suckers, resembling the median ones of the sessile arms, their horny rings having a small aperture, and bearing, on the outside, a large claw-like hook.

Gray overlooked the free eyelids in this genus, and on that account placed it with *Loligo*.

Gonatus Fabricii Verrill.

Sepia loligo Fabricius, Fauna Grœnlandica, p. 358, 1780, (good description).
Onychoteuthis Fabricii Lichtenstein, Isis, xix, 1818, (t. Gray).
Möller, Kroyer's Tidss., iv, p. 76, 1842.
Loligo Fabricii Blainville, Dict. Sci. Nat., xxvii, p. 138, 1823.
Onychoteuthis? amœna Möller, Ind. Moll. Grönl., Kröyer's Tidss., iv, p. 76, 1842, (young.)
Gonatus amœna Gray, Catal. Moll. Brit. Mus., i. Cephal. Antep., p. 68, 1849.
Gonatus amœnus G. O. Sars, Moll. Reg. Arct. Norvegiæ, p. 336, pl. 31, figs. 1–15 (excellent); pl. xvii, fig. 2 (dentition), 1878.
Tryon, Man. Conch., i, p. 168, pl. 73, fig. 290, (descr. from Gray, fig. from H. & A. Adams, Genera).
Verrill, Proc. Nat. Mus., iii, p. 362, 1880.

PLATE XLV, FIGURES 1–1*b*, 2–2*d*.

Body small, elongated, rather slender, tapering backward; front dorsal edge of mantle extending forward in a blunt lobe or angle. Caudal fin very short, but broad, nearly twice as broad as long, the front edges extending forward beyond the insertion, as rounded lobes, lateral angles subacute, posterior angle obtuse. Arms stout and rather long, the dorsal and ventral pairs stouter than the lateral. All the arms bear four rows of small suckers; those of the two median rows (2*c*, 2*d*) are larger than the outer ones, with shorter pedicels, and the very oblique horny ring, having a small opening, is developed into a single, large, hooked tooth on the outer side; around the inner side of the aperture there is a partial circle of small flat scales, in several rows. The suckers of the outer rows (2*a*, 2*b*) are about two-thirds as large, with longer and more slender pedicels, and with lateral apertures; the horny ring has about five acute-triangular teeth on the outer margin, and there are several rows of small scales forming a broad circle entirely around the aperture. The tentacular

arms are long and slender, with broader clubs, which bear a large number of minute suckers, much like the outer ones of the arms, arranged in many crowded rows, some of which extend beyond the club along the arm; in the middle (fig. 1*b*) there is usually one or two larger suckers (absent in our specimen) in which the horny ring has a small aperture and is developed into a large hook-shaped claw, on one side, and a complete circle of small plates surrounds the horny ring.

Pen, thin and delicate, narrow anteriorly, with slender lateral ribs; posteriorly, for more than half the whole length, expanded into a thin lanceolate form; posterior tip laterally dilated, with the edges involute (fig. 1).

A young specimen of this species, in nearly perfect preservation, was recently presented to the United States Fish Commission by Capt. William Demsey and crew, of the schooner "Clara F. Friend". It was taken from the stomach of a cod, off Seal Island, Nova Scotia.

Greenland (Fabricius, Möller). Porsangerfjord, northern coast of Norway (G. O. Sars). Coast of Finmark, in stomach of "coal-fish," abundant (G. O. Sars, Norwegian Exp. of 1878).

D'Orbigny, Gray, and other writers have erroneously referred the *Onychoteuthis Fabricii* (based on the *Sepia loligo* of Fabricius) to *O. Banksii.* The detailed Latin description given by Fabricius applies perfectly to the present species, and not at all to *O. Banksii.* He describes the four rows of suckers on the short arms; the small suckers and two large central hooks on the tentacles; the short caudal fin, etc.

Chiloteuthis, gen. nov.

Allied to *Enoploteuthis*, *Lestoteuthis* and *Abralia*, but with a more complicated armature than either of these genera. Sessile arms with sharp incurved claws, arranged in four rows on the ventral arms, and in two rows on the other arms, (distal portions have lost their armature). Tentacular arms long, with broad clubs, strongly keeled externally, and with series of convective suckers and tubercles extending for some distance along the inner surface of the arms. Tentacular club provided with a marginal row of connective suckers, alternating with tubercles, along one margin; with a central row of unequal hooks, some of them very large; with submedian groups of small, slender-pedicelled suckers (or hooks); with marginal series of small suckers; and with several rows of small suckers covering the prolonged distal portion of the face. Connective cartilages on the base of the siphon, simple, long-ovate; the corresponding processes of the mantle are simple longitudinal ridges. The caudal fin, pen, and many other parts are destroyed.

Chiloteuthis rapax, sp. nov.

PLATE XLIX, FIGURES 1–1*f*.

A specimen of this remarkable squid, in very bad condition, was taken from the stomach of a fish, trawled at station 893, in 372 fathoms, about 100 miles south of Newport, R. I. It was accompanied by a specimen of *Ommastrephes illecebrosa*, in a similar condition. It had lost its pen, its epidermis, and most of the horny hooks and sucker-rings; the head was detached from the body and the caudal fin was nearly destroyed; the eye-lids were gone, but the eye-balls remained. The description must, therefore, remain imperfect till other specimens can be obtained.

The body was rather short and thick, tapering rapidly backward. The caudal fin appears to have been short-rhomboidal, but this is uncertain. The siphon is large, with an internal valve. The connective cartilages (fig. 1*e*) on the sides of the base of the siphon are long-ovate, with the posterior end widest and rounded. The corresponding cartilages on the inside of the mantle are simple longitudinal ridges. Head large, with very large eyes; pupils round. The arms are long and taper to slender tips; the dorsal ones are smaller and shorter than the others; the lateral and ventral pairs are nearly equal in length, and about as long as the mantle; the ventral arms are somewhat more slender than the lateral ones. All the arms appear to have borne slender-pedicelled claws or hooks with strongly incurved, horny points, but only the fleshy parts of these are left, in most cases, and the tips of the arms are bare. On the ventral arms these hooks were smaller, and in four rows; the fleshy portion of these consists of a small rounded head, with lateral lobes, running up, on one side, into an incurved beak, so that the shape is somewhat like a bird's head. On the other arms the claws were in two rows only, but they were much larger; in a few cases, on the lateral arms, the horny claws are left. These are strongly compressed and deeply imbedded in the muscular sheath, only the sharp, incurved point projecting (figs. 1*c*, 1*d*).

The tentacular-arms (fig. 1) are long and strong, their length being more than twice that of the sessile arms. The club is rather stout, long, decidedly expanded, and has an elevated, crest-like keel on the distal half of its dorsal surface; this keel rises abruptly at its origin, and is colored on the outer side, but white on the face next to the inner surface of the club. The club is broadest near its base, the distal third is narrow and the tip rounded. The armature is remarkable: in the middle line there is a row of six medium sized hooks (fig. 1, a''), followed by two much larger ones (fig. 1, a' a), situated near the mid-

dle; these have lost their horny claws; series of minute, slender-pedicelled suckers run along the club, either side of the median line, and beyond the large hooks these rows unite and entirely cover the face of the distal third of the club (fig. 1, *d*), there forming about eight rows; at the tip there is a circular group of minute suckers (*d'*); toward the base of the club the lower side is expanded and bears a row of five peculiar suckers (fig. 1, *e*), having a marginal series of slender, minute, incurved spinules; these suckers have very thick basal processes, which are appressed and directed toward the central line of the club, bearing the suckers on their inner ends, attached by short pedicels; round connective tubercles alternate with these suckers, in the same row; beyond these there is a triangular marginal group of slender-pedicelled suckers (*c*), of about the same size; other rows of minute pedicelled suckers (or hooks) occupied the sub-median area, between the marginal ones and the central line, which is indicated by a strong white cord. The opposite margin of the club appears to have borne several rows of small suckers, but this part is badly injured. A band of minute papillæ (*e'*), apparently the remnants of suckers and alternating connective tubercles, extends downward for more than half the length of the tentacular-arm; at first this band is like a continuation of the connective suckers and tubercles on the margin of the club, and the papillæ are apparently in a single row, while the surface near them is crossed by fine transverse grooves or furrows; but farther down the arms there may have been two or more rows of suckers, which have been destroyed.

The beak (fig. 1 *f*) is somewhat compressed, with very acute mandibles. The upper mandible has the point long and regularly incurved, with the cutting edge regularly arched, without a basal notch, and forming, with the anterior edge, an obtuse angle. Lower mandible, with a strongly incurved tip and regularly concave cutting edge, having no basal notch, and only a slight tooth on the anterior border, which forms a very obtuse angle with the cutting edge.

Color mostly gone, but where still remaining, as on the back of the tentacular club, it consists of minute purple chromatophores; inner surface of sessile arms purplish brown.

Measurements in millimeters.

Length of body	78	Breadth of club	7
Length of dorsal arms	58	Breadth of tentacular arms	5
Length of 2d pair of arms	86	Breadth of lateral arms, at base	6
Length of 3d pair of arms	87	Breadth of dorsal arms	5
Length of ventral arms	85	Diameter of eye-ball	19
Length of tentacular arms	225	Length of connec. cartilages on siphon	14
Length of club	29	Breadth of the same	4

Calliteuthis Verrill.

Amer. Journ. Sci., xx, p. 393, for Nov., 1880 (published Oct. 25); Proc. Nat. Mus., iii, p. 362, 1880.

Body short, tapering to a small free tip; fins small, united behind the tip of the body. Siphon united to the head by a pair of dorsal bands; not sunken in a furrow; an internal valve. Mantle united to the sides of the siphon by simple, linear, longitudinal lateral ridges, corresponding with connective cartilages on the sides of the siphon, which are long-ovate, with a raised margin all around. A dorsal elongated connective cartilage on the neck, opposite the pen. Arms long, not webbed; suckers in two rows, largest on the middle of the lateral and dorsal arms; horny rings of suckers smooth on most of the suckers, simply dentate on the distal ones. Eyes large, with rounded openings and thin, free lids. Buccal membrane simple, sack-like, with seven connective bridles. Internal anatomy of the female similar to that of *Ommastrephes*. Oviducts and nidamental glands symmetrically developed on the two sides. Oviducts opening in front of the bases of the gills, the openings simple, long, narrow, oblique. Two long, ligulate nidamental glands, with acute anterior ends, lie, side by side, and a little apart, on the middle of the visceral mass, behind and over the heart; each of these consists of two halves, folded together, and covered on the inner surface with fine transverse laminæ; the space between them opens along the outer edge.

Calliteuthis reversa Verrill.

Amer. Journ. Sci., xx, p. 393, Nov., 1880; Proc. Nat. Mus., iii, p. 362, Dec., 1880.

PLATE XLVI, FIGURES 1–1*b*.

Body rather short, tapering backward, subacute posteriorly; front edge of mantle advancing somewhat in the middle, and forming an obtuse angle; considerably emarginate beneath. Caudal fin small, short, thin, each half nearly semicircular, attached subdorsally, posterior end emarginate and free from the tip of the body, but not extending much beyond it. Head large, flattened above. Eyes very large, with simple, thin, free, circular lids, without any sinus. Openings of the ears, behind the eyes, minute, with a small, erect, clavate, fleshy process of the skin. Arms long, tapering, equal to the length of head and body combined; the lateral pairs are equal; the dorsal and ventral nearly equal, somewhat shorter than laterals; suckers deeper than broad, well rounded, laterally attached by slender pedicels; horny rings with smooth, circular, thin edges, except on the

small suckers, toward the tips of the arms, in which the outer edge is divided into a number of small, narrow, blunt teeth. On the ventral arms, the suckers are much smaller. Basal web rudimentary; a narrow, thin, simple membrane along each side, outside the suckers. Tentacular arms rather slender, compressed, smooth at base, the ends absent. Color reddish brown. The ventral surface of the body, head, and arms is more ornamented than the dorsal surface, being covered with large, rounded verrucæ, their center or anterior half pale, the border, or posterior half, dark purplish brown; upper surface of body with much fewer and smaller scattered verrucæ; a circle of the same around the eyes; inner surfaces of sessile arms and buccal membranes chocolate-brown, tentacular arms lighter; suckers pale yellow with a light brown band. Caudal fin white, translucent. Iris, in the preserved specimen, brown. Gills with the free edge brown, and a brown line on the outer edges of all the laminæ.

Total length, to end of lateral arms, 133^{mm}, to base of arms, 67^{mm}; mantle, 51^{mm}; of fin, 17^{mm}; breadth of fins, 24^{mm}; of body, 20^{mm}; diameter of eye-ball, 16^{mm}; length of dorsal arms, 58^{mm}; of second pair, 67^{mm}; of third pair, 68^{mm}; of ventral pair, 60^{mm}; breadth of dorsal arms at base, 5^{mm}; of lateral, 6^{mm}; diameter of largest suckers, $1{\cdot}2^{mm}$.

Dredged by the steamer "Fish Hawk," of the U. S. Fish Commission, at Station 894, about 100 miles south of Newport, R. I., N. Lat. 39° 53′; W. Long. 70° 58′ 30″, in 365 fathoms.

Mastigoteuthis Verrill.

Bulletin Mus. Comp. Zool., vi, 1881.

Body elongated, tapering to a point, confluent with the caudal fin posteriorly. Caudal fin very large and broad, rhomboidal, occupying about half the length of the body. Mantle fastened to the base of the siphon by an ovate, ear-shaped, elevated cartilage, on each side, fitting into corresponding deep, circumscribed pits on the base of the siphon. Siphon with a bilabiate aperture, an internal valve, and a pair of dorsal bridles. Eyes large, with round pupils; lids free, thin, apparently with a very small anterior sinus. Arms very unequal, the ventral ones much the longest. Suckers small, in two regular rows. Tentacular arms long and round, tapering to the tips, shaped like a whip-lash, without any distinct club; the distal portion is covered nearly all around with exceedingly numerous and minute suckers, which leave only a very narrow naked line along the outside. Pen narrow and bicostate anteriorly, very slender in the mid-

dle; posteriorly much larger, with a long tubular cone. This remarkable genus differs widely from all others hitherto described in the character of the tentacular arms and suckers. This, with the great size of the caudal fin, gives a very peculiar aspect to the species.

Mastigoteuthis Agassizii Verrill.

Bulletin Mus. Comp. Zool., vol. vi, pl. 1, fig. 1; pl. 2, figs. 2, 3-3*g*, 1881.

PLATE XLVIII. PLATE XLIX, FIGURES 2, 3–3*g*.

Body elongated, round anteriorly; posteriorly tapering rapidly to the slender, acute, terminal portion, which is confluent with the caudal fin, to the tip. Front dorsal edge of mantle emarginate in the middle. Caudal fin very large and broad, transversely rhomboidal, obtuse posteriorly, its length, from origin to tip, about equal to half the combined length of the head and body. Eyes large, with thin lids, which appear to have had a distinct but very small sinus in front; pupils circular; iris brown, in alcohol. Sessile arms very unequal; ventral arms much larger and longer than the others, about equal to length of head and body; dorsal arms very small, scarcely one-third the length of the ventral pair; two lateral pairs nearly equal, decidedly longer and stouter than the dorsal pair. A delicate thin, marginal membrane extends along the arms, outside the rows of suckers, to the slender tips. Suckers small, in two regular rows on all the arms, subglobular, with small oblique apertures, surrounded by small horny rings, which have a nearly entire margin, and by several series of minute plates (Plate XLIX, fig. 3*g*).

Basal web, between the arms, very small. In the smaller specimen, which is a male, the right ventral arm is longer than the left, and the tip appears to have been flattened, and the marginal membranes seem to have been wider, with the edges infolded, so as to form a sort of furrow on the outer side, but the suckers are mostly gone, and it is too much injured to be accurately described. Tentacular arms long, more than twice the combined length of the head and body, slender, round, gradually tapering to the tip, like a whiplash, the distal half of their length covered with very numerous, crowded, minute, pedicelled suckers (fig. 3*d*), which cover nearly the entire surface along the terminal portion, leaving only a narrow naked line along the back, but farther from the tip this naked space becomes gradually wider and the band of suckers narrower, and after these crowded bands of suckers cease, scattered suckers, placed mostly two by two, extend for some distance along the proximal part of the arms. The suckers of the tentacular arms are so small that their form can-